Transitional Year Residency Program

Educational goals and objectives by rotation:

Rotation name: Medical Intensive Care Unit (MICU)

Location: Lahey Clinic

Program Director: Gerry Orfanos, M.D.

Faculty Representatives: Andrew Villanueva, M.D., Carla Lamb, M.D.

Length of Rotation: 4 weeks

Overview

Tufts Transitional Year Resident can spend 1 month of elective time at the Medical Intensive Care Unit (MICU) at Lahey Clinic. This elective needs to be planned ahead of time at least 2 months in advance.

Purpose of the MICU Team

Our purpose is to provide excellent total and continual care to critically ill patients admitted to the MICU service. Through a collaborative and multi-disciplinary team approach, we work to provide care that is effective, efficient and humane, 24 hours a day, seven days a week.

Role of the Medical Residents in the MICU

Medical residents rotating through the MICU are an integral part of a team that includes an attending physician, a Pulmonary and Critical Care Medicine fellow, nurses, nursing assistants, respiratory therapists, nutritionists and unit managers. While the attending physician has ultimate responsibility for the care rendered, each member of the medical team has important responsibilities. Most of the direct patient care is provided by the residents, including the physical assessment of patients, the performance of procedures and the writing of all orders. The second- or third-year resident also should act as a supervisor and teacher, and should assist the fellow and attending in evaluating patients being considered for transfer to the MICU. The fellow works closely with the attending in coordinating and supervising the care rendered and in deciding who is admitted to and discharged from the MICU. All major patient care decisions should be discussed with the fellow or attending. All procedures by residents should be supervised by the fellow or attending until the resident demonstrates competence in performing a particular procedure. The insertion of pulmonary artery catheters should always be supervised by a fellow or attending.

Non-physician members of the MICU team are valuable resources and provide useful recommendations on a variety of patient care issues, including ventilator management, nutrition, pharmacology, psychosocial matters and ethical issues.

Rounds in the MICU

Pre-Rounds: Residents review any notable overnight events and familiarize themselves with the latest physical findings, laboratory results, culture results, X-rays and medications.

X-ray/Work Rounds*:* X-ray rounds followed by rounds with the MICU team to review each patient's status, assess all problems and generate a treatment plan for the day.

Case Presentations on Work Rounds

1. For new patients, standard case presentation: Pertinent history, physical examination, labs, electrocardiograms (EKGs), X-rays, special tests, etc.

2. For patients already in the MICU, review of the last 24 hours: Be aware of any changes in examination and be familiar with vital signs, intake and output (I/O), hemodynamic data, recent lab results, recent microbiology results, EKG, radiological studies and all of a patient's medications. In the MICU, details are important.

3. Discussion should be problem-oriented. Common problems encountered in the MICU include shock (always problem #1), sepsis, pneumonia, acute respiratory distress syndrome (ARDS), chronic obstructive pulmonary disease (COPD) and respiratory failure, congestive heart failure (CHF) or pulmonary edema, renal failure, gastrointestinal (GI) bleeding, thrombocytopenia, drug overdose and agitation/anxiety. Assessment and plan should be organized problem by problem.

4. "Housekeeping issues" for all MICU patients include:

   a. Invasive monitors (dates of insertion and number of days):

      i. Endotracheal tube

      ii. Nasogastric (NG) tube

      iii. Arterial line

      iv. Central venous catheter

      v. Pulmonary artery (PA) catheter

      vi. Foley catheter

      vii. Surgical drains

   b. Nutrition

   c. Deep-vein thrombosis (DVT) prophylaxis

d. Stress gastritis prophylaxis

5. Nursing issues, psychosocial issues

6. Brief review of 24-hour plan

Physician orders should be written promptly. Verbal orders are discouraged unless they are “telephone orders” given when the resident is not in the MICU.

Afternoon rounds: Afternoon rounds are needed in critically ill patients to follow up on the morning plan and to review the events of the day. Potential problems that could occur overnight should be anticipated and discussed. During these rounds, the MICU attending and/or fellow will meet with the on-call Pulmonary attending and/or fellow and the on-call residents to briefly review the status and overnight plans for the patients on the MICU service. Later in the evening, the fellow or attending may also contact the resident on call to discuss any problems.

Do not hesitate to call the MICU attending or fellow for any problems with any of the patients. Page the attending or fellow on call for problems during the night.

Medical Record Documentation

Residents are responsible for writing full admission notes, daily progress notes, procedure notes and physician orders, and dictating discharge summaries. The progress note should describe significant events of the previous 24 hours, significant symptoms, significant signs and relevant data. The note should delineate the MICU team’s assessment and plans for each of the patient’s problems.

Procedures in the MICU

Patients in the MICU often need mechanical ventilation and invasive monitoring. Residents are expected to learn and perform, under the supervision of the fellow or attending, procedures commonly needed in the ICU setting, including arterial cannulation, central venous cannulation, pulmonary artery catheterization, airway management and endotracheal intubation. Proper technique for these procedures will be taught in both didactic sessions and at the bedside.

Insertion of Arterial and Central Venous Catheters

1. All line insertions or changes should be done as soon after work rounds as possible.

2. Residents and interns inserting arterial or central venous catheters should be supervised by the MICU fellow or attending until they have demonstrated competence in the technique.

3. Pulmonary artery catheters placed in MICU patients must be supervised by a MICU attending or fellow at all times.

4. After two unsuccessful attempts at localization and cannulation of the artery or central vein, the resident should yield to a more experienced operator.

Guidelines for Catheter Management

1. Central venous catheters and PA catheters should be placed using strict aseptic technique with full barrier precautions—mask, cap, gloves, sterile gown, long sterile drape, etc. Personnel in the room should wear masks and caps.

2. Mask, cap, gloves, sterile gown and sterile drapes should be used when inserting arterial catheters. Personnel in the room should wear masks and caps.

3. There are data that regular catheter changes over a guide wire do not reduce risk of catheter-related infections, and that regular catheter changes at a new site may reduce the risk of catheter-related infections but increase the risk of mechanical complications such as bleeding or pneumothorax.

Current recommendations:

Central venous catheters may remain in place as long as needed provided there is no evidence of catheter-related sepsis (unexplained fever >48h after catheter insertion, positive blood culture, local signs of infection at the insertion site).

Pulmonary artery catheters should be changed every four days.

If there is suspicion of catheter-related sepsis, the catheter should be changed to a new site if the original site appears infected.

4. In changing catheters over a guide wire

a) Use aseptic technique and full barrier precautions

b) Glove twice—change gloves after pulling out the original catheter and before inserting the new catheter over a guide wire

c) Replace entire delivery system (tubing and bags/bottle)

d) Quantitatively culture the old catheter tip if the patient has an explained fever, leukocytosis or other signs of infection

e) If the catheter culture is later positive (>15 bacterial colony forming units), the new catheter should be removed and a new site selected for a fresh central venous catheter. Any fungal growth on a catheter tip is considered a catheter-related infection.

5. Because the risk for catheter-related infection is apparently less for arterial lines compared to central venous lines, it seems reasonable to maintain necessary arterial lines for approximately seven to eight days if the insertion site appears uninfected. However, because the risk for

pseudoaneurysm formation is related to the duration of catheterization, a new insertion site should be used rather than changing the arterial line over a guide wire.

6. These guidelines discourage the practice of routine line changes every three to five days but do not give us license to ignore the lines. Rather, they encourage the use of clinical judgment in deciding if and when a line should be changed.

Guidelines for Endotracheal Intubation

1. All intubations should be supervised by the MICU attending, MICU fellow or an anesthesiologist. If a MICU patient requires intubation during nighttime hours, contact the Surgical Intensive Care Unit (SICU) resident on-call; there is also an attending anesthesiologist in house if needed. Call for assistance before attempting intubation. The SICU resident or the anesthesiologist is in charge of managing the airway once he or she arrives at the bedside; it is up to the SICU resident or anesthesiologist to decide whether the MICU resident should attempt intubation, but the MICU resident should not be afraid to ask.

2. After one unsuccessful attempt at intubation, the resident should yield to a more experienced operator.

A Word About Drawing Blood

1. Be judicious in blood tests ordered. Remember that blood is a valuable commodity and should not be wasted. Unnecessary blood loss is all too common in ICUs.

2. There is a laboratory policy to draw no more than four sets of blood cultures per 24-hour period unless a supervisor approves more.

Didactic Sessions (during the month of the MICU rotation)

- Mechanical ventilation and weaning from mechanical ventilation
- Use of pulmonary artery catheters
- Enteral and parenteral nutrition
- Radiology in the ICU
- Vasopressors
- Sepsis
- Acid-base disorders
- Common fluid-electrolyte disorders in the ICU
- Sedation in the ICU

- Neurologic emergencies
- Pharmacokinetics
- Critical Care Lecture Series (see below)

Practical Instruction

- Airway management
- Central venous, pulmonary artery and arterial cannulation
- Calibration and operation of hemodynamic recording systems
- Monitoring patients on mechanical ventilation
- Two mandatory one-hour sessions of live simulation of code scenarios

Written Information

MICU residents' packet (with useful handouts)

Critical Care Medicine Lecture Series Topics

In addition to the didactics offered during the MICU month, the following topics are given during each academic year on a rotational basis during lunchtime resident conference.

- Introduction to critical care medicine: assessing the seriously ill patient
- Patient safety in the ICU
- Basic airway management
- The difficult airway
- Acute respiratory failure
- ARDS
- Mechanical ventilation: standard modes and newer modes
- Weaning from mechanical ventilation
- Massive venous thromboembolism
- Massive hemoptysis
- Shock and multi-system organ dysfunction
- Sepsis and septic shock
- Hypertensive emergencies
- Vascular cannulation
- Hemodynamic monitoring
- The unstable cardiac patient
- Acute renal failure and renal replacement therapy

- Severe electrolyte abnormalities
- Severe acid-base disturbances
- Neurological emergencies
- Coma and delirium
- Neurosurgical emergencies
- Severe acute pancreatitis
- The acute abdomen
- Acute hepatic failure
- Severe GI bleeding
- Basic trauma care
- Antibiotic use in the ICU
- Ventilator-associated pneumonia
- Catheter-related infections
- Nutritional support in the ICU
- Sedation, analgesia and neuromuscular blockade in the ICU
- Severe hyperthermia and hypothermia
- Poisonings and overdose
- The use of blood and blood products
- Obstetrical issues in the ICU
- Ethical dilemmas in the ICU
- End-of-life care in the ICU
- Psychosocial and emotional effects of critical illness on patients and their families
- Pharmacologic issues in the ICU
- Taking care of the geriatric patient in the ICU
- Organ donation
- Critical care of the immunocompromised patient
- Critical care of the transplant patient
- Bioterrorism
- Disaster management
- Burn care

Clinic During the MICU Rotation

While the residents' weekly outpatient clinic assignments will continue, a resident should not have clinic the day after being on call. The schedules also should be adjusted so that no more than one MICU resident will be in clinic on a given

afternoon. Residents should check with Dr. Orfanos' office to make sure that their clinic schedules are appropriate for the MICU rotation.

Principle Educational Goals Based on the ACGME General Competencies

Listed below by PGY level are the principle educational goals of the Medical Intensive Care curriculum integrated with the six ACGME competencies:

1. Patient Care (PC)

2. Medical Knowledge (MK)

3. Practice-Based Learning and Improvement (PBL)

4. Interpersonal and Communication Skills (IPS)

5. Professionalism (Prof)

6. Systems-Based Practice (SBP)

7. The educational goals are cumulative as one advances through residency training. The abbreviations for the type of learning environment and evaluation method are defined below.

Learning environment and evaluation methods:

1. Resident work rounds RWR*

2. Attending rounds (Teaching) ART*

3. Attending rounds (Work) ARW*

4. Didactic lectures DT*

5. Directly observed procedures DOP

6. Nursing/staff evaluations SE

7. Simulation scenarios for ACLS SM
8. MICU handout packet LR*
    a. Literature reviews
    b. Up-to-Date
    c. Computer-based learning

* Primary venues of teaching/learning (additional items will be cited as appropriate)

PGY-1

- Interpret arterial blood gas and simple acid base disorders (PC, MK)

- Interpret chest radiograph (proper identification of tubes/lines) (MK)

- Define shock states (distributive, obstructive, hypovolemic, cardiogenic) (PC, MK, PBL)

- Demonstrate consistent practice in infection control (hand washing) (PC)

- Identify indications for central venous access and invasive hemodynamic monitoring (DOP) (PC, PBL, SBP)

- Identify properly the pulmonary artery catheter wave forms (MK)

- Identify and understand the arterial catheter wave form (MK)

- Demonstrate sterile technique with invasive procedures (DOP) (PC)

- Cite potential complications of invasive access (DOP) (PC)

- Maintain an accurate procedure log (DOP) (Prof)

- Demonstrate safe and proper placement of postpyloric feeding tube (DOP) (PC)

- Demonstrate sensitivity in informing family of care plan as well as code status (SE) (PC, ISC, Prof)

- Demonstrate sensitivity in request for autopsy (SE) (PC, ISC, Prof)

- Demonstrate courtesy in interaction and recognize the importance of all medical staff—nursing, physical therapy, pharmacy, chaplain, respiratory therapy (SE) (ISC, Prof, SBP)

- Demonstrate legible and complete documentation in all aspects of the patient medical record (SE) (ISC, Prof, SBP)

- Demonstrate full documentation of informed consent for all procedures (SE) (ISC, Prof, SBP)

- Identify indications for intubation (DOP) (MK)

- Identify anatomic landmarks for intubation (DOP) (MK)

- Cite extubation criteria (MK)

- Identify pneumothorax in the mechanically ventilated patient by change in respiratory parameters and other clinical changes on the mechanical ventilator and by chest radiograph (PC, MK)

- Participate in CODE resuscitation (ACLS and SM) (PC, MK, PBC, ISC, SBP)

- Demonstrate knowledge of and initial management of the following disease states: sepsis/septic shock, GI hemorrhage, diabetic ketoacidosis, hypoxemic and hypercapnic respiratory failure, myocardial infarction, pulmonary embolus, multilobar pneumonia, pancreatitis, multi-system organ failure, initial triage and

differentiation of various shock states (treatment of hypovolemic shock, cardiogenic shock, obstructive shock), cardiac arrhythmias/valvular disease, cardiac tamponade and meningitis (MK)

- Identify various drug overdose syndromes and associated anecdotal treatments (MK)